WHAT WE CLAIM ARE:

1. An optical function device comprising:

a core layer containing photonic crystals formed by ferroelectric members made of a ferroelectric substance and periodically disposed along a one-dimensional direction or two-dimensional directions; and

electrodes for applying an electric field to the core layer.

2. An optical function device according to claim 1, wherein polarization axes of the ferroelectric members in the core layer stand upright along a thickness direction of the core layer.

3. An optical function device according to claim 1, further comprising a clad layer disposed on both sides of the core layer and sandwiching the core layer, an effective refractive index of the clad layer being smaller than an effective refractive index of the core layer.

4. An optical function device according to claim 3, wherein the clad layer has a periodical structure having regions of different refractive indices disposed periodically.

5. An optical function device according to claim 3, wherein the clad layer contains photonic crystals formed by ferroelectric members made of a ferroelectric substance and periodically disposed along a one-dimensional direction or two-dimensional directions.

6. An optical function device according to claim 5, wherein the ferroelectric members of the core layer and the ferroelectric members of the clad layers are made of a same ferroelectric substance and are homogeneous in terms of a crystal structure.

7. An optical function device according to claim 6, further comprising fillers filled in between the ferroelectric members of the clad layers and the core layer, wherein a refractive index of the filler in the core layer is higher than refractive indices of the fillers in the clad layers.

8. An optical function device according to claim 5, wherein a refractive index of the ferroelectric members in the core layer is higher than refractive indices of the ferroelectric members in the clad layers.

9. An optical function device according to claim 8, further comprising a filler filled in between the ferroelectric members of the clad layers and the core layer, wherein the fillers in the clad layers and the filler in the core layer are made of a same substance.

10. An optical function device according to claim 5, wherein the ferroelectric members in the core layer and the ferroelectric members in the clad layer are made of different ferroelectric substances, the optical function device further comprises a filler filled in between the ferroelectric members in the clad layer and core layer, and the fillers in the clad layers and the filler in the core layer are made of different substances.

11. An optical function device according to claim 1, wherein the ferroelectric members constituting the core layer are oriented in such a manner that directions of one of the (001), (110) and (111) planes of the ferroelectric members are uniform.

12. A variable wavelength optical filter, comprising:

a first optical filter; and

a second optical filter upon which a laser beam transmitted through the first optical filter becomes incident,

wherein each of the first and second optical filters comprises:

a core layer containing photonic crystals formed by ferroelectric members made of a ferroelectric substance and periodically disposed along a one-dimensional direction or two-dimensional directions; and

electrodes for applying an electric field to the core layer,

and wherein band gaps of the photonic crystals of the first and second optical filters are apart from each other by a wavelength interval.

13 A variable wavelength optical filter according to claim 12, wherein an alignment period of the ferroelectric members of the first optical filter is different from an alignment period of the ferroelectric members of the second optical filter.

14. A variable wavelength light source comprising:

a laser oscillator for radiating a laser beam having wavelength distributed in a range from a first wavelength to a second wavelength;

a first optical filter upon which the laser beam radiated from the laser oscillator becomes incident; and

a second optical filter upon which a laser beam transmitted through the first optical filter becomes incident,

wherein each of the first and second optical filters comprises:

a core layer containing photonic crystals formed by ferroelectric members made of a ferroelectric substance and periodically disposed along a one-dimensional direction or two-dimensional directions; and

electrodes for applying an electric field to the core layer,

and wherein band gaps of the photonic crystals of the first and second optical filters are apart from each others by a wavelength interval and partially overlap the range between the first wavelength and the second wavelength.

15. A variable wavelength light source according to claim 14, wherein an alignment period of the ferroelectric members of the first optical filter is different from an alignment period of the ferroelectric members of the second optical filter.

16. An optical function device comprising:

a core layer including a first member disposed periodically along a one-dimensional direction or two-dimensional directions and a second member filled in between the first members, the first and second members constituting a photonic crystal, and at least one of the first and second members being made of a substance having a character that a refractive index is changed upon generation of an electric field; and

electrodes for applying an electric field to the core layer.

17. An optical function device according to claim 16, wherein the first member is made of ferroelectric material having a piezoelectric effect and the second member is made of material softer than the first member.

18. An optical function device according to claim 16, wherein each of the ferroelectric members constituting the core layer extends from one surface to the other of the core layer, and the electrodes are disposed sandwiching the core layer and directly contact each of the ferroelectric members.

19. An optical function device according to claim 16, wherein the ferroelectric members constituting the core layer are aligned in such a manner that directions of one of (001), (110) and (111) planes of the ferroelectric members are uniform.

20. An optical function device according to claim 16, further comprising a clad layer disposed on both sides of the core layer and sandwiching the core layer, an effective refractive index of the clad layer being smaller than an effective refractive index of the core layer.

21. A variable wavelength optical filter comprising:

a first optical filter; and

a second optical filter upon which a laser beam transmitted through the first optical filter becomes incident,

wherein each of the first and second optical filters comprises:

a core layer including a first member disposed periodically along a one-dimensional direction or two-dimensional directions and a second member filled in between the first members, the first and second members constituting a photonic crystal, and at least one of the first and second members being made of a substance having a character that a refractive index is changed upon generation of an electric field; and

electrodes for applying an electric field to the core layer,

and wherein band gaps of the photonic crystals of the first and second optical filters are apart from each other by a wavelength interval.

22. A variable wavelength optical filter according to claim 21, wherein an alignment period of the ferroelectric members of the first optical filter is different from an alignment period of the ferroelectric members of the second optical filter.

23. A variable wavelength light source comprising:

a laser oscillator for radiating a laser beam having wavelengths distributed in a range from a first wavelength to a second wavelength;

a first optical filter upon which the laser beam radiated from the laser oscillator becomes incident; and

a second optical filter upon which a laser beam transmitted through the first optical filter becomes incident,

wherein each of the first and second optical filters comprises:

a core layer including a first member disposed periodically along a one-dimensional direction or two-dimensional directions and a second member filled in between the first members, the first and second members constituting a

photonic crystal, and at least one of the first and second members being made of a substance having a character that a refractive index is changed upon generation of an electric field; and

electrodes for applying an electric field to the core layer,

and wherein band gaps of the photonic crystals of the first and second optical filters are apart from each other by a wavelength interval and partially overlap the range between the first wavelength and the second wavelength.

24. A variable wavelength light source according to claim 23, wherein an alignment period of the ferroelectric members of the first optical filter is different from an alignment period of the ferroelectric members of the second optical filter.

25. A method of manufacturing ferroelectric members comprising the steps of:

forming a resist film on a substrate;

forming openings in the resist film, the openings being disposed periodically along a one-dimensional direction or two-dimensional directions;

filling precursor solution of a ferroelectric substance in the openings and drying the solution to form precursors;

removing the resist film; and

baking the precursors to form ferroelectric members.